The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

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The Fine Chemical Industry

THE simile of the stone which, when thrown into water, causes ripples that spread to the farthest edge of the pond must have been evident in the minds of many who heard Dr. Durrans's paper to the London Section of the Society of Chemical Industry on "The Fine Chemical Industry as a Servant of the Community." The paper was in itself an encyclopædia of industrial organic chemicals and their utilisation; as such it will provide a mine of information for a few years, after which, to judge from the speaker's account of the pace of modern development, many new chemicals will have been found to have industrial importance and will have displaced those now established. A paper of this character needs to be revised every two or three years. No attempt was made at the meeting to define what is meant by a "fine chemical." Dr. Durrans appeared to regard fine chemicals as comprising every organic substance manufactured for sale upon a small or moderate scale. With so wide a field to cover, there was no difficulty in showing that the fine chemical industry provided important raw materials for most of the major industries in the country. Particular mention was made of rubber goods, plastics, paint, varnish, lacquer, and linoleum, of the control of surface tension (including wetting applications and emulsifiers), of lubrication, of insecticides and fumigating materials, though here the development is more potential than actual, of flavouring substances and essences, of cosmetics that beautify the feminine countenance—or disguise its beauty, according to the view one takes of them—of photographic chemicals, of drugs and medicines, of the many substances derived from alcohols (including higher alcohols, aldehydes, ketones, acids, and glycerols), to say nothing of many individual substances used for specific purposes, such as diphenyl for fluid heat transmission systems, flotation reagents, laboratory reagents, sweetening material, synthetic fibres, lead tetra-ethyl—but the list is interminable. Unquestionably the fine chemical industry is a key industry if ever there was one.

Fortunately, past British Governments had foreseen its importance, because the British fine chemical industry really dates from the passing in 1921 of the Safeguarding of Industries Act. Up to that time we had lagged greatly behind certain other nations. Never was the folly of war more vividly exposed. The Germans could have dominated the world in this branch of chemistry, had they not disclosed to other nations their commercial danger by making war on them in 1914. From that war dates an immense development of the fine chemical industry not only in this country, but also in Canada, the U.S.A., and the U.S.S.R. We have had occasion previously to remark on the immense sums of money expended in research in the U.S.A., and on the huge dividends that research has yielded there in the form of unbelievable expansion in the chemical industry. Something has been done to put research in this country on a more comprehensive basis in one branch of the fine chemical industry—that of medicinal chemicals. The formation of the Therapeutic Research Corporation of Great Britain, Ltd., which was announced in our advertising columns on November 29, is an action fraught with important potentialities for the development of this branch of the industry.

Something else, however, remains to be done, and unfortunately the next step does not rest with the industry itself. The tendency in the fine chemical industry is to move away from aromatic compounds towards aliphatic compounds. This development emanates from America where petroleum is the starting point for all that great series of chemicals that can be derived from alcohol. Much of this development has as its starting point the once wasted permanent gases from petroleum refineries. On these is being based a huge organic chemical industry that bids fair to make the United States the greatest manufacturer of chemicals in the world, and particularly of fine chemicals. Great Britain shares with the U.S.A. and Russia possession of the oil resources of the world. It is nearly true to say, as was said by Sir Edward Edgar after the last war: "All known oilfields, all the likely or probable oilfields outside the United States and Russia, are in British hands or under British management or control or financed by British capital." Why then should our organic chemical industry be in danger in face of the chemical utilisation of petroleum in other countries?

The answer is that our oil industry for the most part does its refining at the oilfields instead of in this country. It is demonstrably cheaper to bring crude oil here and to refine it in this country than to refine it abroad and ship each refined product separately. It may be necessary to have certain refineries abroad for military reasons, but there is a clear need for Government action after the war to insist that all oil used in this country or sold by us to European countries, is refined here. In that way our chemical manufacturers can be given the chance to build up a great organic chemical industry as other nations are doing. This is no light matter; we trust that the Association of British Chemical Manufacturers will make it their business to look into it.

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NOTES AND COMMENTS

Greeting to Our Readers

THE CHEMICAL AGE herewith conveys to all those engaged in the chemical and chemical engineering industries the heartiest wishes of the Christmas season and the best hopes for a year of rising prosperity. The industry has continued to play a part of many-sided importance in the nation's activities, not the less vital because many of its developments have had to progress under the veil of secrecy; managements and operatives alike have settled down into a war-time routine and the industry has proved itself fully capable of dealing both with the hard day-to-day grind of war work and with sudden emergencies necessitating a supreme temporary effort. So far as it is possible to review the year's progress in industrial chemistry, this is being undertaken by THE CHEMICAL AGE early in January. It will be seen that British chemists all over the Empire have been far from idle and that their energy and ingenuity remain unsurpassed. For them as for the rest of the working nation the year 1942 will be one of unflagging effort, uphill perhaps, but tending always towards the ultimate victorious goal.

Empire Drug Production

A SPECIAL aspect of the fine chemical industry, a general discussion of which figures in our leading article to-day, was dealt with by Dr. Maurice Ashby in the paper which he presented last week to the Dominions and Colonies Section of the Royal Society of Arts. His subject was "British Empire Drug Production," and, as he said, such a subject covers an extremely wide field. It is manifestly impossible to deal with every side of so diversified a topic, but in our view Dr. Ashby presented an extremely comprehensive summary of the situation. Vegetable drugs are, in the nature of things, an extraordinarily chancy commodity. Plants will not behave to order in any set of circumstances, and careful, often long-enduring, research is necessary to determine their reactions to a given set of climatic and ecological conditions. An extreme case is that of the basil *Ocimum gratissimum*, whose oil, when produced in the Seychelles, contains 62 per cent. of phenols, principally eugenol, but when grown on the Ivory Coast turns up with 44 per cent. of phenols consisting almost entirely of thymol. With the possibility of erratic behaviour of that kind, the selection of a new habitat can produce some first-class surprises. However, Empire drug production is not always quite so tough a proposition as that, and Dr. Ashby's catalogue of progress in the Dominions and Colonies produces some grounds for optimism. New methods of collecting cascara bark are in operation in Canada; Australian and New Zealand agar-agar will oust the Japanese product; Indian drugs are almost unlimited in their possibilities; and, best of all, the pyrethrum industry of Kenya, thanks to a fortunate environment and an excellent marketing organisation, has increased production from 13 tons in 1933-4 to an export of 4600 tons last year to the U.S.A., valued at $82½ million.

A New Scientific Quarterly

THIS month will see the publication of a British scientific quarterly with the name *Endeavour*. It will be a new development in scientific journalism. It is designed to keep before the world the continuing vitality and progress of the sciences in the service of mankind, and will be published in four editions—English, Spanish, French and German. The aim of this publication is to act as a counter to the flood of German propaganda that they are the only scientific people. Its circulation, therefore, except for a small percentage, will be exclusively restricted to the British Empire and foreign countries, where it will be distributed mainly to colleges, scientific institutions, clubs and prominent individuals. It will be published by Imperial Chemical Industries with the co-operation of the British Council. The editor, Dr. E. J. Holmyard, will be assisted by a panel composed of Professor Allan Ferguson, Professor Sir Robert Robinson, Dr. R. E. Slade and Dr. C. H. Waddington. The main feature of the first issue will be an article on "The Distance of the Sun" by the Astronomer Royal, Dr. H. Spencer Jones. Other contributors include Professor Sir William Bragg, Professor C. M. Yonge, Mr. J. G. Crowther, Mr. A. L. Bacharach, Mr. G. V. Jacks, Dr. F. Fairbrother, Professor J. Read, and Dr. C. H. Waddington. The correspondence columns include messages or letters from Sir Henry Dale, President of the Royal Society, Sir Richard Gregory, President of the British Association, Sir John Russell, Director of the Rothamsted Experimental Station, Sir James Jeans, Dr. Julian Huxley, and Professor E. N. da C. Andrade. One from Professor A. V. Hill affords the clue to the choice of name *Endeavour*. In 1786 the great navigator, Captain Cook, set sail in the *Endeavour* barque, accompanied by English men of science, to chart the Southern Pacific and observe the transit of Venus. "May your *Endeavour*," writes Professor Hill, "record discoveries as famous as those made by Captain Cook."

U.S. Chemical Engineers

PROBLEMS of priorities, materials, equipment, and efficiency of plant processes occupied the five technical sessions of the annual meeting of the American Institute of Chemical Engineers held last month at Virginia Beach. Incidentally this was the largest meeting in the history of the Institute, with 559 members and guests in attendance, a fact that augurs well for the prospects of chemical engineering in America's war-effort. Full utilisation of national resources to meet war-time shortages was an important point under discussion, and Mr. R. E. McConnell, opening the symposium, emphasised the need to use what he described as "passive scrap." This, he contended, included metal that could not be classified as scrap pure and simple, but was represented by metals and other materials held over and above immediate needs. The large safety factor at present included in calculated requirements afforded another source of "passive scrap." Increased production capacity and the uses of substitute materials were yet other ways of utilising national resources to the full. With two years of war behind us, we have already delved fairly deeply into matters of this kind, but it is good news to hear that the chemical engineers of America are alive to the exigencies of the situation. Following the general discussion with which the meeting opened, many members dealt skilfully with plant-operating processes which should bring fully into play the national resources of the United States. Chemical engineers to-day in America must feel that it is a privilege to belong to their profession, and to be able to exercise their skill in developing the huge resources of their country, still largely untapped, in an emergency which will call for all their industry and ingenuity.

MOLECULAR DISTILLATION, II

Design of Condensation Pumps

by D. D. HOWAT, B.Sc., A.I.C. A.Inst.M.M., Ph.D.

(*Continued from* THE CHEMICAL AGE, *December* 20, 1941, *p.* 311)

ONE of the first types of fractionating condensation pump developed by Hickman is shown in Fig. 1. The pump consists essentially of two vertical glass pumps in

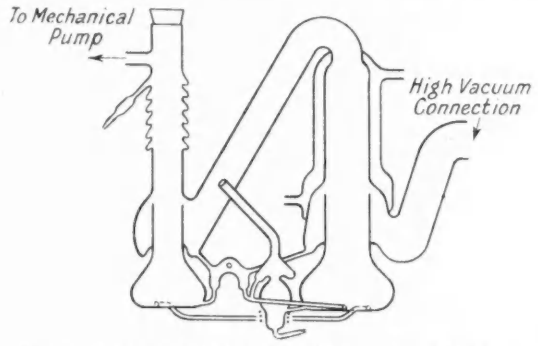

Fig. 1. Early type of fractionating condensation pump developed by Hickman

tandem, one, the fore pump, and the other, the fine pump. The fore pump, fitted with a short receiving jet, terminates in a series of small re-entrant bulbs designed to retain the highly volatile impurities. The fine pump is larger and, when necessary, is water-jacketed, the boiler being fitted with two outlets, one connected to the boiler of the fore pump and the other to a small evaporator or sink from which there are no exits except for gas and condensate. During operation the condensate from the fine pump is returned to the fore pump, in which the highly volatile materials are boiled out, collecting in the re-entrant bulbs. The less volatile materials constituting the main bulk of the liquid percolate back to the fine pump boiler, where they operate under low backing pressure. Any tarry materials of poor volatility and of little use in the pump gradually drain to the sink. The pumps designed by Lockenvitz, Malter and Sykes have all somewhat similar features and resemble Hickman's pump in several aspects, Malter in fact describing his pump as a modification of Hickman's.

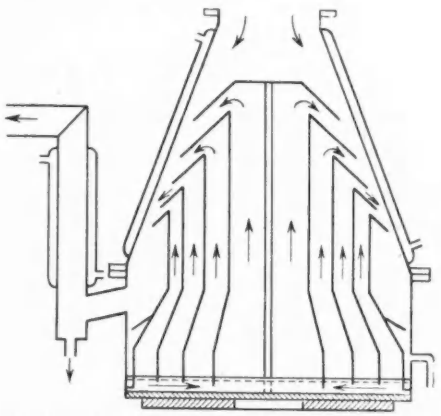

Fig. 2. Vertical type of fractionating condensation pump, designed by Burrows

An early patent covering modifications of the vertical type of fractionating condensation pumps was granted to Burrows.[13] One of the designs suggested is included in his later patent,[13] describing how a high vacuum still may be mounted above and in vertical alignment with the pump. The two pump designs covered in the earlier patent are shown in Figs. 2 and 3. Inside the pump shown in Fig. 2 a number of concentric uptake tubes are provided, each fitted with a cowl, thus forming a series of jets. The lower ends of these tubes dip into the working liquid, ending a short distance above the base of the boiler and forming a series of annular sections. Connecting passages are thus left, allowing the liquid from one section to percolate to the others. When boiling of the liquid begins the more volatile constituents escaping first are condensed on the cooled outer walls of the pump and accumulated in the outer annular compartment of the boiler. The bulk of the liquid, of lower volatility, percolates through the annular compartments towards the centre of the pump; this portion of the liquid is used most effectively, as it feeds the primary jets at the high vacuum end of the pump. Unlike other pumps of similar design, the main condenser is of conical shape, being secured by a vacuum joint to the main

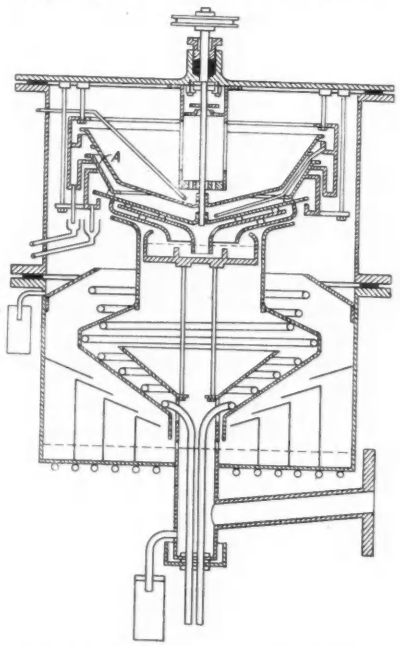

Fig. 3. Unit structure composed of a centrifugal still of Hickman's design mounted above a vertical (inside-out) fractionating pump invented by Burrows

cylindrical casing. The vapour uptake tubes may be made with flared portions as indicated.

The second design, referred to by the inventor as an "inside-out pump," differs in having the vapour jets directed inwards towards a sheet-metal condenser body of conical form. Secured to the inner surface of the condenser is a coil of pipe for the circulation of cooling fluid, the condenser being separate and distinct from the main pump casing. The high vacuum jets, being greatest in diameter, have the largest projective area, while the low vacuum jets have the smallest projective area. To ensure satisfactory operation of these fractionating condensation pumps a back pressure of at most 0.5 mm. is required.

Efficient back pressure may be maintained by means of a rotary oil-sealed vane type pump exhausting directly to the atmosphere, or by a steam jet injector.

Criticising the design of vertical pumps generally, Hickman[7] states that they suffer from the following disadvantages:

(a) The low vacuum jets, nearest to the fore-vacuum requiring the smallest projective area for the vapour stream, are greatest in diameter. This necessitates fine clearances and careful construction.
(b) The boundaries of the concentric boilers are long compared with the areas encouraging mixing of the constituents and favouring thermal leakage.
(c) The areas of the boilers are determined by the dimensions of the jets. The areas cannot be increased unless the tubes are expanded at the base, thus destroying much of the simplicity of construction.

Advocates of the vertical design of pump point out, however, that:

(a) The low vacuum jets may be made least in diameter as shown in Fig. 3.
(b) Methods of construction whereby the boundaries of concentric boilers need not be long compared with the areas are shown in Figs. 2 and 3.
(c) The areas of the boilers need not be determined by the dimensions of the jets as shown by the construction adopted in Fig. 2. This construction does undoubtedly offer greater difficulties from the engineering point of view.

In concentrating upon the design of horizontal fractionating condensation pumps, Hickman[7] gives the following as his reasons.

(a) The boiler area is independent of jet diameter.
(b) The heat input to each boiler division may be precisely regulated.
(c) The high vacuum end may be made large and the fore vacuum end small in diameter.
(d) The horizontal construction allows the fractionating unit to serve as the straight pipe between the mechanical pump and the side of the vacuum vessel.

The main features of most recent types of horizontal pump, designed by Hickman[7] and described in his paper and covering patents, may be outlined as follows. On the under side of the cylindrical main pump casing a truncated cone-shaped extension forms the boiler. The jet manifold, also cylindrical, is inserted inside the main pump casing, but is split at the base to form two supporting ribs which locate its position in the casing. The extension of the pet manifold in the high vacuum end of the pump is constricted to form a circular opening covered by an umbrella type of jet. The manifold is divided vertically into a series of compartments which communicate with one another by small holes in the base of the partitions. In this way flow of liquid takes place through the compartments while passage of vapour is prevented. A series of annular jets is formed by conical flanges fixed to the outside of the manifold at intervals corresponding with the positions of the vertical partitions, the vapour from each boiler compartment issuing through a series of small holes located just beneath those flanges. In some of the designs the walls of the manifold taper towards the high vacuum end so that the annular space between the jets and the main pump casing increases. Hickman proved that when the fore pressure for the high vacuum jet has been reduced to 10^{-3} mm. or less by a series of intermediate jets, the mean free path of the gas in random or sideways movement below the jet is more than 1 in. and clearances of 1 to 3 in. may be used without diminishing the admission coefficient. In operation the boiler is filled to a given depth with pumping fluid which is heated by electrical resistance elements embedded in the base of the main casing. Vapour from each compartment issuing from the jets is deflected by the jet covers in the direction of the backing pump. Vapour from the mushroom jet in the high vacuum end sweeps the gases from the vessel to be evacuated, passing them on to the action of the intermediate jets. More highly volatile substances persisting in the vapour state for a fairly long period will be carried towards the low vacuum end of the pump. Some may condense, returning to the first boiler compartment, while others will remain in the vapour state until they enter the connecting pipe to the backing pump, where suitably arranged baffles prevent their return to the boiler. Only the less volatile liquids will percolate through the holes in the baffles, becoming volatilised in the compartments nearer the high vacuum end. The vapours from these compartments on issuing from the jets will condense rapidly, returning to the boiler compartment from which they were evaporated. Therefore pumps of this type exert a fractionating effect in both the liquid and vapour phases, an eminently valuable feature when large through-puts of semi-volatile contaminants must be cleaned from a relatively dirty chemical system. (*See* Figs 4 to 7.)

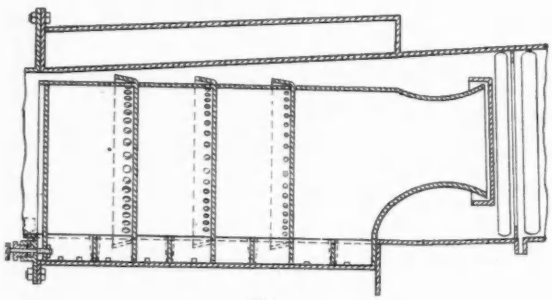

Fig. 4

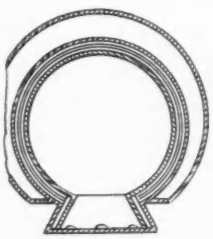

Fig. 5

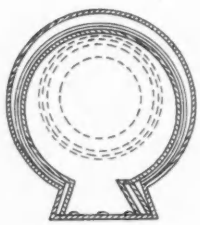

Fig. 6

Various features of Hickman's horizontal pump. Figs. 5 and 6 are cross-sections of the pump in Fig. 4, taken at the left and in the centre of the diagram respectively. Fig. 7 is the modified design of the final jet

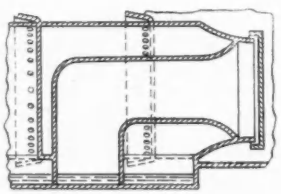

Fig. 7

Two additional features in design and operation call for comment. First, the vapours generated from the last compartment feeding the high vacuum jet are the least volatile, exhibiting a decided tendency to condense even at relatively high temperatures. To prevent this, the pipe conducting the vapours to the final jet is kept warm by allowing vapours from one of the intermediate boilers to circulate around it. The design is shown in Fig. 7. Second, a new and improved type of jet, designed by Dr. N. D. Embree, has been found to give greatly increased pumping speeds. With the normal type of umbrella jet employed in condensation pumps the annular space between the pump mouth and the condenser walls must be small to prevent the flow of organic vapour back into the evacuated space. High fore pressure or improper cooling of the different sections around the jet increases the tendency for this backward flow. Hickman[7] states that the pump walls below the umbrella jet on which the molecules of the organic vapour impinge should be kept warm. This provides for incomplete condensation to ensure dilution and entrainment of the gas concentrated near the walls and also to preserve the downward passage of the gas stream. In the

new Embree jet shown in Fig. 8, the vapour passes to the final jet through a venturi-shaped tube with a distinct constriction about two-thirds of the distance from the intermediate jet. This arrangement provides a vertical downward inwardly expanding path for the vapours issuing from the jet, largely eliminating the tendency to wander laterally or diffuse backwards. The jet may be made of

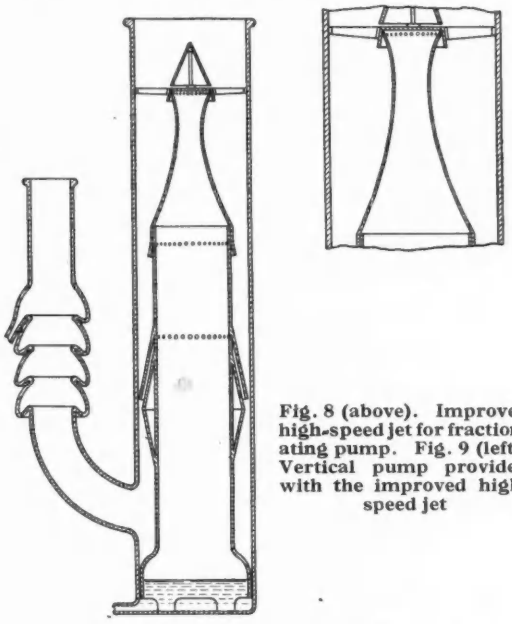

Fig. 8 (above). Improved high-speed jet for fractionating pump. Fig. 9 (left). Vertical pump provided with the improved high-speed jet

small diameter, leaving a clearance of 1½ to 3 inches between the edge of the jet and the pump casing, and materially increasing the pumping capacity. In spite of the high pumping capacity, the wide clearance makes it necessary to use a fore vacuum pressure of less than 0.01 mm. This can only be attained by employing the high-speed jet in conjunction with intermediate vapour jets operating against higher backing pressures and producing a sufficiently low pressure to allow the high-speed jet to function efficiently. A 21-in. pump of this type constructed by Hickman has a speed of 7000 litres per second at a pressure of 10^{-3} mm. To prevent the gases from the evacuated chamber impinging on the heated top of the jet and diffusing backwards, various types of baffle have been devised; a stepped conical baffle proposed by Hickman is highly efficient.

These pumps, developed by Distillation Products Inc., under the direction of Dr. Hickman, have gone far to increase the scope and efficiency of the whole process of molecular distillation.

(To be continued.)

Chemical Matters in Parliament

Chemists in Administrative Posts

IN the House of Commons last week, Mr. Liddall asked the Parliamentary Secretary to the Ministry of Supply the number of chemists employed in administrative posts in his department, and how many of these were unpaid.

Replying, Mr. Harold Macmillan said that the number of senior officers with one or other of the recognised chemical qualifications, who were engaged in the Ministry of Supply on that account and were mainly employed in functions of an administrative character, was approximately 17. Of these, seven receive no salary from Ministry funds. These figures excluded staff of Royal Ordnance Factories and other out-station establishments. He was unable to say how many of the less senior positions were held by chemists.

A CHEMIST'S BOOKSHELF

MAGNETISM IN RELATION TO CHEMICAL PROBLEMS. By K. N. Mathur, D.Sc., F.Inst.P. Lucknow University Studies. No. VIII. Pp. 185. Rs. 2/7/9.

This is the eighth volume in a series published by the Faculty of Science of Lucknow University, and edited by B. Sahni, Sc.D., F.R.S. Magnetism, more than any other subject, has presented different facts according to whether it has been studied from a physical or a chemical point of view. From a purely physical standpoint, interest has mainly centred upon ferro-magnetic metals and alloys. The chemical outlook has been concerned rather with the applications of magnetic methods of attack to the long-standing problems with which the chemist has been confronted, and magnetic investigations have been largely occupied with the study of the diamagnetism of salts and solutions. The author presents the subject from the angle of the chemist; in a brief and clear review, he deals with the problems that frequently arise in chemical research and in a way that does not require a specialised knowledge of magnetism to undertake. An exact list of references, of physical constants and of notations, as well as an author- and subject-index, complete a thoroughly satisfactory account of the development of this important new subject.

U.S.S.R. SPEAKS FOR ITSELF. Vol. I: Industry. London: Lawrence and Wishart. Pp. 95. 2s. 6d.

This is the first of a series of booklets dealing with the development of Soviet Russia. The volume on "Industry" consists of nine chapters, each by a different author who has distinguished himself in the world of science or industry in Russia. Astronomical figures of the potential resources of the Soviet Union give much reassurance as to the staying power of that State, and the progressive development of industry since the inception of the sovietic system of government appears really remarkable. Only about three pages are devoted to the chemical and allied industries.

Versatile Protective Coating

High Chemical Resistance and Quick Dipping

A NEW protective coating material, Miccroplastic, providing chemical resistance to all acids and plating solutions, alkali cleaners and petroleum spirits, has been produced by the Michigan Chrome and Chemical Co., Detroit, according to a report in the *Iron and Coal Trades Review* (1941, *143*, p. 553). It has the flexibility of soft rubber, will not crack, provides exceptional adhesion to every portion of any metallic surface it covers, is very free-flowing and is applied directly to the cleaned surface. It is dipped easily—one dip requiring only 5 sec. for submersion and immersion. It also contains high solids, dies to a high gloss, and it makes a good coating for hard chromium-plating racks. The only equipment required is a small dipping tank and a baking oven. After submersion and immersion, racks are air-dried for about a half-hour and then baked for one hour at 225° F. Seven coats are recommended for each rack.

AIR HUMIDITY METER

A new apparatus for measuring air humidity, inexpensive to build and operate, yet accurate in its results, was recently described before the meeting of the American Geophysical Union by Dr. C. W. Thornwaite of the U.S. Soil Conservation Service. The most accurate technique is to pump air through some absorbing chemical which will extract the water from it, when increasing weight of the chemical shows how much water has been extracted. Methods of this sort, however, have hitherto been both cumbersome and delicate, better adapted of laboratory than for field use. Dr. Thornwaite's device, which can be used in the field, employs an ordinary hypodermic syringe as an air pump, driven by a small motor that will run for months on end on a dry cell battery. The air is pumped through a bent tube containing alumina, and a sufficiently sensitive chemical balance completes the equipment.

Personal Notes

MAJOR STANLEY M. MOHR, O.B.E., M.C., M.I.E.E., and MR. H. W GRAESSER-THOMAS have been re-elected chairman and vice-chairman respectively of the British Plastics Federation, Ltd., for the 1941-42 session.

MR. T. D. MORISON, lately Deputy Controller of Factory Premises, succeeds SIR THOMAS BARLOW, K.B.E., as Controller of Factory Premises, Sir Thomas having been appointed Director-General of Civilian Clothing and a member of the Industrial and Export Council.

DR. HENRY NORMAN RYDON has been awarded the Harrison Memorial Prize for 1941 by the committee of the Chemical Society. Dr. Rydon has been particularly distinguished for his researches on aliphatic acids. He was awarded the Meldola Medal of the Institute of Chemistry in 1939 and in 1937-40 worked with Sir Robert Robinson in the Dyson-Perrins Laboratory at Oxford.

The honour of a Viscounty, conferred upon SQUADRON-LEADER THE RT. HON. WEDGWOOD BENN, D.S.O., D.F.C., M.P., will remove from the House of Commons one who has adorned it since 1906. This elevation to the Peerage will also have a special interest for readers of THE CHEMICAL AGE, as he was formerly actively associated with the great publishing undertaking of which this journal forms a part, and of which Sir Ernest Benn, his brother, is the chief proprietor. Comparatively early in his career Squadron-Leader Benn decided to make his way in politics rather than in business, and a long and successful representation of three constituencies culminated in his appointment as Secretary of State for India in 1929, an office which he occupied with distinction until 1931. In the war of 1914-18 Squadron-Leader Benn served with the Royal Air Force with outstanding brilliance, being awarded both the D.S.O. and the D.F.C. Early in the present war he returned to his old service. He will be greatly missed on the floor of the Commons, and will lend to the Upper House a distinction in debate and a political experience of the first order.

Obituary

SIR FRANCIS D'ARCY COOPER, BART., chairman of Lever Brothers and Unilever, Ltd., and chairman of the Executive Committee of the Export Council, Board of Trade, died at Reigate on December 18, aged 59. A brief notice of his death was included in our last week's issue as we went to Press. An accountant by profession, he was admitted in 1910 to a partnership in the family firm of Cooper Brothers and Co., in 1910, after 11 years of service. His professional work was interrupted by war service in 1915-19; he was wounded on the Somme in August, 1916, and after a period in hospital, received an appointment at the War Office. In 1919 he returned to Cooper Bros., and his association with the Lever companies was renewed. Appointed senior partner in the firm, he was elected to the board of Lever Brothers, Ltd., in 1923 as joint vice-chairman, being promoted to the position of chairman on the death of Viscount Leverhulme, the founder of the Lever concerns, in 1925. Years of intense activity led to a serious illness in 1939, and though he never recovered his former robustness, it was characteristic of Cooper that he scarcely slackened his activities. He played a leading part in the formation of Export Groups during the last two years and undertook an important trade mission to America at the end of last year. He was created a baronet in the King's birthday honours this year. Sir Francis leaves a widow and no children, and the baronetcy becomes extinct.

Sir F. D'Arcy Cooper, Bt.

SIR MILTON SHARP, BART., who died on December 17 at Penrith, aged 61, was for some years a director of the Bradford Dyers' Association.

LIEUT. W. J. DAVIES, South African Forces, formerly of Tonyrefail, Mon., has been killed in action. Lieut. Davies, who entered the service of Imperial Chemical Industries some years ago, subsequently went to South Africa as explosives manager at the Chamber of Commerce, Johannesburg.

MR. THOMAS EDWIN RYDER LIGHTFOOT, who has died at Ansdell, Lytham, at the age of 82, was formerly the principal chemist at the Broad Oak Works, Accrington, of the Calico Printers Association, Ltd. His own 51 years' association with the firm was only part of a family connection with dyeing and printing chemistry dating from 1818.

PROFESSOR EMILE PICARD, whose death at the age of 85 is announced in Paris, was permanent secretary to the French Academy of Science and had been president of the International Council for Scientific Research. He was a foreign member of the Royal Society and of the Royal Society of Edinburgh, and was especially distinguished in the field of pure mathematics.

New Control Orders

Export Licensing

UNDER a Board of Trade Order (S.R. and O. 1941, No. 2014) which comes into force on January 6, export control is extended to cover further types of metal manufactures and machinery and certain additional cotton manufactures and chemicals. Licences will, in future, be required to export to all destinations: articles manufactured wholly or mainly of iron or steel; ethylene dichloride (dichlorethane); and thiourea. It should be noted that applications for licences to export ethylene dichloride will not normally be entertained.

Borax and boric acid, the exportation of which without licence was prohibited to all destinations may, in future, be exported without licence to destinations within the British Empire. Pyroxylin, the exportation of which was previously prohibited to certain destinations only will, in future, require licences for all destinations.

British Chemical Prices

Market Reports

MARKET conditions generally have remained comparatively steady throughout the past week with offers of most chemicals finding a ready outlet. The flow of contract deliveries to the consuming industries has been on a good scale and some attention is being given to forward requirements. In both the potash and the soda products sections activity is influenced by the quantities available for near-by delivery. Bichromate, chlorate, and yellow prussiate of soda are being called for in quantities greater than the available supply, while continued tightness prevails in the market for yellow prussiate of potash. Oxalic, citric, and tartaric acids are firm and elsewhere prices display a strong undertone. A steady trade is recorded for lead oxides, with quotations unaltered at the recently advanced levels. Among the coal tar products no information is yet available about the control of crude carbolic acid and cresylic acid, and these items have remained quiet. In other directions the solvent and heavy naphthas are enjoying a steady demand, but xylols are perhaps a little less active.

MANCHESTER.—Allowing for seasonal influences, trading conditions on the Manchester chemical market during the past week have been fairly good, though there has been a certain amount of interference with contract deliveries. Not much in the way of actual price movements has occurred since a week ago, but there is no question about the generally strong tone and a further stiffening of rates in several directions in the near future would occasion little surprise. In the by-products section new inquiry has not been particularly active, the good contract qualities are going into consumption in most classes of materials.

General News——From Week to Week

The Ministry of Supply announces that the Miscellaneous Chemical Control has moved from Iron Trades House to Terminal House, 5th Floor, 52 Grosvenor Gardens, London, S.W.1. (Tel: SLOane 2271).

Boot polishes and floor polishes are added to the list of price-regulated articles under the Prices of Goods Act, 1939, by a Board of Trade Order (S.R. & O., 1941, No. 2024), which came into force on December 17.

Christmas greetings and the host of good humour gallantly contained in the "600" Magazine, published by George Cohen, Sons and Co., Ltd., have had a welcome reception in the offices of The Chemical Age. The smaller format, continued from last year as a paper-saving measure, has done nothing to lower the quality of the contents.

The following have been elected members of the Society of Public Analysts: W. J. Colbeck; H. J. Davis; I. Dembrey, B.Sc., A.I.C.; R. W. Dunlop; R. L. Edwards, Ph.D., B.Sc., F.I.C.; J. F. Gardner; J. D. D. Harding, A.I.C.; F. W. Jackson, A.C.G.I., B.Sc., A.I.C.; J. L. West, A.I.C.; and L. V. S. West,

The Christmas Number (No. 179) of George Kent, Ltd.'s "Information Bulletin" is a real reminder of the need to save paper. It consists simply of a sheet of pasteboard, postcard size, and conveys a message of goodwill to their friends at home and abroad, and a reminder that they are still "engineers for the measurement and control of all fluids."

Continued progress is being made in the development of textiles which are completely synthetic, according to Dr. Henry Dreyfus in his speech at the annual meeting of British Celanese, Ltd., last week. Textile materials are being built up from coal, whether made from carbon, hydrogen, and oxygen, or carbon, hydrogen, and nitrogen, or otherwise.

The Board of the Institute of Physics has appointed a planning committee "to watch and to advise the Board on matters affecting physics and physicists, including their education and training, and on post-war planning." The constitution of the committee, which has power to co-opt, is as follows: Professor Sir Lawrence Bragg, Professor J. A. Crowther, Mr. E. R. Davies, Dr. H. Lowery, Major C. E. S. Phillips, Dr. C. Sykes, Dr. F. C. Toy.

Documents bearing Dalton's signature have become extremely rare since all the Dalton relics preserved by the Manchester Literary and Philosophical Society were destroyed in an air raid. *The Pharmaceutical Journal* reports, however, that Mr. J. R. Walmsley, Ph.C., has presented to the Pharmacy Department of Manchester University a certificate signed by John Dalton to the effect that a certain pharmacy student had attended a course of his lectures in chemistry.

The following Fellows have been elected by the Board of the Institute of Physics: P. W. F. Berg, Ph.D.; W. Binks, M.Sc.; R. E. Clay, M.Sc., D.I.C.; V. E. Cosslett, M.Sc., Ph.D.; L. Frommer, Dr.Ing.; E. Green, B.Sc., Ph.D.; O. W. Humphreys, B.Sc.; D. E. A. Jones, B.Sc.; R. L. Maughan, M.Sc.; and L. W. Phillips. Twenty-two associates were also elected and 25 subscribers and 39 students admitted to the Institute.

Fines totalling £5500, plus 50 guineas costs, were imposed at Woking in connection with breaches of the Limitation of Supplies Orders by Messrs. A. H. Price (Wholesale) Chemists, Ltd., Guildford Road, Woking, who were alleged, by the counsel prosecuting for the Board of Trade, to have "hawked round quotas they did not possess." Prosecuting counsel, Mr. Eric Dean, said that the firm had made a total illegal profit of £3703. There was a plea of guilty on 10 summonses against the firm and on 10 summonses against each of three directors, Harry Meyer Levin, of Cricklewood, William Henry Johnstone, of Woking, and John Keall, of Putney. Ten similar summonses against another director, Dr. Henry George Neilson, were not proceeded with.

Control of rubber will in future be exercised by the Rubber Control Board, states a Ministry of Supply announcement. Sir George Beharrell, chairman of the Dunlop Rubber Co., will preside; other members are Sir Walrond Sinclair, chairman of the British Tyre and Rubber Co., who will be concerned particularly with the United States, Mr. W. G. Essex, and Mr. Rupert S. Thomson. An additional member will be appointed later.

Foreign News

Mercury production has begun in New Zealand at the Puhipuji deposit, near Whangarei, of Mercury Explorations, Ltd. The recovery of mercury from the low-grade deposits at Ngawha and elsewhere is being investigated.

Corundum exports from South Africa, amounting to 2941 tons, went chiefly to the United States in the first six months of 1941. A plant to treat corundiferous rocks and to prepare a concentrate for export is now in process of erection at Pietersburg, Northern Transvaal.

A bill for the introduction of zinc coinage has been introduced in the Danish parliament, and a complete requisition has been made in Denmark of all materials containing nickel. All stocks of nickel-containing raw materials and alloys, nickel waste and semi-manufactures, pure nickel and nickel sulphate, have been requisitioned by the Directorate of Supply.

Imports of crude glycerin into the United States amounted to 6,153,500 lb., valued at $455,400, during the first eight months of 1941, compared with 4,720,000 lb., valued at $345,000, during the same period of 1940. Exports were 6,721,800 lb., at $832,300, from January-August, compared with 8,721,100 lb., at $1,159,900, in the same period of 1940.

Rumanian oil production has declined 40 per cent. since the peak year of 1936, according to statistics published in the *Rumanian Petroleum Monitor*. As the decline manifests itself throughout the oilfields it is believed that the cause is the approaching exhaustion of supplies. Total production has fallen steadily from 8,700,000 tons in 1936 to 5,750,000 in 1940, and this year's figure is not expected to exceed 5,200,000.

According to a bulletin published by the Geological Survey of India, vast deposits of phosphates are present in the country. It is estimated that there are 8,000,000 tons in the Trichinopoly District, Madras, and over 700,000 tons in the Singhbum District, Bihar. Up to the present, however, no serious attempt has been made to exploit this valuable raw product, even though India imports fairly large quantities of fertilisers.

Washington reports state that official action has been taken to expedite the delivery of the machinery and equipment ordered for the new Brazilian steel plant; this is expected to result in the plant reaching maximum production by the end of 1943. The plant referred to is possibly the one mentioned in our issue for November 8 as about to be established at Volta Redonda, Rio de Janeiro.

Forthcoming Events

Dr. R. F. Bowles, Ph.D., will lecture on "Industrial Developments of Recent Research on Drying Oils" before a meeting of the **Birmingham Paint, Varnish, and Lacquer Club,** on the afternoon of **January 3,** at the Grand Hotel, Birmingham.

The second of the series of meetings arranged to discuss the improved use of fuel and power in industrial plants (see The Chemical Age, for December 13) will take place on **January 3,** at 2.30 p.m., in the Large Theatre, H. H. Wills Laboratory, Royal Fort, Bristol, 6, when Mr. J. G. Bennett, F.Inst.F., member of the Fuel Efficiency Committee of the Mines Department, will open the discussion.

A joint meeting of the Food Group and the London Section of the **Society of Chemical Industry** will be held on **January 5,** at 2.15 p.m., in the rooms of the Chemical Society, Burlington House, W.1, when Mr. G. A. Freak, B.Sc., F.I.C., will lecture on "Insecticides."

Inventions in the Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of Specifications accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Complete Specification.

Applications for Patents

Thermal deposition of metals.—P. Alexander. 11864.

Clay guns.—Ashmore, Benson, Pease and Co., Ltd., W. R. Brown and N. A. Graveson. (Dec. 13, '40.) 11634.

Production of zirconia.—M. O. Axt and F. W. Berk and Co., Ltd. 11720.

Alloys.—E. A. Bano. 11887.

Manufacture of pigments.—British Titan Products Co., Ltd. (United States, Dec. 24, '40.) 11942.

Filters.—Chema Manufacturing Co., Ltd., and M. Sigmund. 11815.

Production of unsaturated ketones, and their related alcohols.—Colmore Adhesives, Ltd., and T. White. 11714.

Production of 2-methyl-3-keto-butanol and methyl isopropenyl ketone.—Colmore Adhesives, Ltd., and T. White. 11715.

Apparatus for discharge of viscous, etc., materials.—R. E. Crofts. 11668.

Preparation of dry yeast products.—Distillers Co., Ltd., and E. A. Meyer. 11931.

Recovery of acetaldehyde.—Distillers Co., Ltd., H. P. Staudinger, K. H. W. Tuerck, and E. H. Brittain. 11662.

Carbonisation of coal.—F. L. Duffield. 11912.

Sizing compositions.—E. I. du Pont de Nemours and Co. (United States, Sept. 21, '40.) 11688, 11689.

Solutions of polyamides.—E. I. du Pont de Nemours and Co. (United States, Oct. 24, '40.) 11891.

Manufacture of methylol amides.—E. I. du Pont de Nemours and Co. (United States, Oct. 25, '40.) 11892.

Liquid cements.—E. I. du Pont de Nemours and Co. (United States, Nov. 29, '40.) 11893.

Cellulosic material.—E. I. du Pont de Nemours and Co. (United States, Dec. 11, '40.) 11894.

Soluble oils and cooling emulsions for cutting tools.—E. A. Evans and N. E. F. Hitchcock. 11868.

Iron oxide briquettes.—N. L. Evans and Imperial Chemical Industries, Ltd. 11774.

Method and apparatus for carbonising ligneous, etc., substances.—Fubex, Ltd., and A. B. Futo. 11862.

Production of cellulose derivatives.—W. H. Groombridge and J. Downing. 11639.

Nickel-depositing baths.—Hanson-Van Winkle-Munning Co. (United States, Oct. 12, '40.) 11853.

Process for removal of metal from metal castings, etc.—W. Hayhurst. 11850.

Method and apparatus for heat treatment of rosin.—Hercules Powder Co. (United States, Sept. 16, '40.) 11807.

Complete Specifications Open to Public Inspection

Process for the manufacture of high anti-knock motor fuel. Texaco Development Corporation. Dec. 30, 1938. 31845/39.

Fluid-heaters. Foster Wheeler, Ltd. March 13, 1940. 2130/41.

Filtration of molten sulphur.—E. I. du Pont de Nemours and Co. March 9, 1940. 2245/41.

Preservation of wood.—Electric Research Products, Inc. March 13, 1940. 3084/41.

Manufacture of cycloheptenyl barbituric acids.—J. R. Geigy A.-G. March 9, 1940. 3182/41.

Manufacture of chlorinated hydrocarbons.—E. I. du Pont de Nemours and Co. March 9, 1940. 3196/41.

Fluorescent coatings and methods of manufacture.—British Thomson-Houston Co., Ltd. March 14, 1940. 3284/41.

Fluorescent materials.—British Thomson-Houston Co., Ltd. March 14, 1940. 3285/41.

Fatty acid arylhydrazide sulphonic acids.—J. R. Geigy A.-G. March 12, 1940. 3303/41.

Polymeric materials.—E. I. du Pont de Nemours and Co. March 13, 1940. 3362/41.

Tetracyclic ketones.—Soc. of Chemical Industry in Basle. March 14, 1940. 3510/41.

Tetracyclic compounds.—Soc. of Chemical Industry in Basle. March 14, 1940. 3511/41.

Germicidal soap.—Givaudan Delawanna, Inc. March 15, 1940. 3537/41.

Thermal treatment of materials.—A. E. Fox. March 12, 1940. 3652/41.

Complete Specifications Accepted

Process for obtaining carbon dioxide from flue gases.—G. T. Reich. Dec. 12, 1939. 538,866.

Method of generating heat by chemical means.—United States Appliance Corporation. Jan. 3, 1939. 538,948.

Halogenated polymers of ethylene.—D. Whitaker and Imperial Chemical Industries, Ltd. Jan. 16, 1940. (Cognate applications, 971/40 and 17045/40.) 538,871.

Appliances for mixing and distributing liquid disinfectants or other fluids.—D. G. Hall. Feb. 15, 1940. 538,905.

Manufacture of sulphonamide derivatives.—J. R. Geigy A.-G. Dec. 23, 1939. 538,884.

Organic nitrogen compounds and their application.—A. W. Baldwin, D. Hey, M. A. T. Rogers, and Imperial Chemical Industries, Ltd. Feb. 16, 1940. (Addition to 517,632.) 538,846.

Apparatus for the treatment of gases.—W. C. Holmes and Co., Ltd., E. M. Lake, W. Sykes and F. B. Holmes. Feb. 16, 1940. 538,847

Production of impregnated paper and laminated articles.—Corn Products Refining Co. March 18, 1939. 538,953.

Dispersing ores and the like.—American Cyanamid Co. March 3, 1939. 538,908.

Production of glycollic acid derivatives.—E. I. du Pont de Nemours and Co. Feb. 17, 1939. 538,909.

Preparation of substantially sulphur-free manganese alloys. Consolidated Mining and Smelting Co. of Canada, Ltd. Feb. 20, 1939. 538,886.

Production of cellulose esters.—British Celanese, Ltd. (Celanese Corporation of America). Feb. 20, 1940. 538,913.

Manufacture of dyestuffs of the phthalocyanine series.—Soc. of Chemical Industry in Basle. March 13, 1939. 538,957.

Production of coloured products containing organic film-forming substances.—G. Lord and G. Reeves. Feb. 21, 1940. 538,958.

Production of cellulose esters.—British Celanese, Ltd. Feb 28, 1939. (Cognate application, 3275/40.) 538,959.

Apparatus for catalytic reactions.—O. D. Lucas and C. Pleydell-Bouverie. Feb. 22, 1940. (Addition to 534,743.) 538,992.

Manufacture of resinous mixed ester-ether compounds of polyhydric alcohols.—Soc. of Chemical Industry in Basle. March 23, 1939. 538,993.

Cupro-ammonium process for the production of artificial filaments.—Asahi-Bemberg Kenshi K.K. June 23, 1939. 538,966.

Machines for coating containers with paraffin wax and the like.—American Can Co. March 17, 1939. 538,968.

Glass having an expansion lower than that of silica and process for the manufacture thereof.—Corning Glass Works. April 22, 1939. 538,891.

Explosives.—A. Smith. March 12, 1940. 538,920.

Process for glazing fabrics and yarns.—Rohm and Haas Co. May 23, 1939. 538,897.

Synthetic resinous condensation products and the like.—British Rubber Producers' Research Association and F. J. W. Popham. March 29, 1940. (Cognate application, 16205/40.) 538,922.

Process for separating wool fat from wool washing liquids. J. G. Fife (N. V. de Bataafsche Petroleum Mij.). April 4, 1940. 538,899.

Preparation of composite pigments containing titanium dioxide.—A. H. Stevens (Interchemical Corporation). April 16, 1940.) 539,002.

Process for the manufacture of concentrated stable solutions of C,C-disubstituted barbituric acids.—Sandoz, Ltd. May 17, 1939. 538,927.

Apparatus for use in the carbonation of liquids.—M. Sussmann. April 30, 1940. 538,937.

Process for recovery of metals from alloys and metallurgical residues.—C. B. White. May 1, 1940. 539,006.

Process for extinguishing fires by means of precipitates of inorganic substances.—I. O. Reich. June 7, 1939. 539,018.

Method of treating manganese and manganese alloys for the reduction of the boron content.—Consolidated Mining and Smelting Co. of Canada, Ltd. Feb. 20, 1939. (Divided out of 538,886.) 538,901.

Production of water-soluble derivatives of alkylol amides.—J. Katz. Aug. 16, 1939. (Divided out of 538,825.) 538,859.

Coating and manufacture of pipes and similar hollow bodies from cementitious or similar plastic materials.—W. R. Hume. Aug. 2, 1938. (Cognate applications, 22445/39, 22446/39, and 22447/39.) 540,324.

Amended Specification Published

Recovering polyhydric alcohols from aqueous solutions, etc. Speas Development Co. 525,315.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

BRITISH CERAMICS AND CRYSTAL, LTD., Brierley Hill. (M., 27/12/41.) December 1, £200 debentures, part of a series already registered. *Nil. October 17, 1940.

JOHN GAUL (METAL PRODUCTIONS), LTD., London, W. (M., 27/12/41.) December 3, assignment to Barclays Bank, Ltd., securing all moneys due or to become due to the Bank; charged on all moneys due or to become due to the company under every contract placed or to be placed with the company by certain specified companies.

Declaration of Solvency

MOORE AND RAYNER, LTD. (D.S.F., 27/12/41.) Declaration of solvency filed, December 4.

Company News

George Kent, Ltd., have declared a dividend of 3 per cent. for the current year (same).

The Anglo Continental Guano Works, Ltd. (which is controlled by Fison, Packard and Prentice, Ltd.) is paying a dividend of 17½ per cent. for the past year, compared with 10 per cent. for 1939-40.

Chemical and Allied Stocks and Shares

YEAR-END influences, and the widespread tendency to await war developments in the Far East, have made for inactive conditions in all sections of the Stock Exchange. The undertone in British Funds remained relatively steady, but among industrial shares the trend was slightly reactionary. There has been a further marking down of shares of companies with important interests in the Far East, such as Burmah Oil, Anglo-Iranian, "Shell" and Dunlop Rubber, but there was again no heavy selling in evidence. Moreover, in the majority of industrial securities, the recent set-back in values, following the extension of the war, has been moderate when compared with the advance shown on balance for the year.

In fact, during the past twelve months there has been a general improvement in all classes of security values. Sentiment generally has been aided by the trend in British Funds, and industrial shares have been assisted by the fact that many leading companies playing an important part in the war effort have been able to keep dividend rates at around the same levels as in the previous year. Taxation, of course, bears very heavily on earnings, and lower net profits and reduced dividends have been inevitable in some cases. Imperial Chemical, however, was able to maintain its dividend at 8 per cent., and B. Laporte kept its payment at 15 per cent. on the larger capital ranking. On the other hand, Turner and Newall recently announced a "cut" in their dividend from 15 per cent. to 12½ per cent., while earlier this year, Boots Drug reduced their payment to 24 per cent. (compared with 30.9 per cent. paid in the previous year), but this was conservative as the sum added to reserves and to the balance carried forward would have paid a further 18½ per cent. in dividend.

The rise in share values during the year, however, has been based not so much on the dividend yield as on the scope that may exist for recovery in earnings and dividends after the war. The general tendency is to take the long view, although it is realised that lower dividends may rule in the more immediate future, and that meanwhile, market values must be expected to fluctuate in accordance with the trend of the war news. Imperial Chemical, which were down to 28s. at one time earlier this year, are now 32s., and B. Laporte at 63s. 9d are 12s. 6d. above the lowest price recorded in 1941. Most other leading shares of companies connected with the chemical and kindred industries have not maintained best prices touched in 1941, but are well above the lowest recorded during the year. Tube Investments at 86s. 3d. and Turner and Newall at 66s. 3d. are, however, closing the year at around their lowest for 1941. This is, of course, a reflection of the reduced dividends, which had not been expected in the market; in both instances, taxation provisions have borne very heavily on profits.

The units of the Distillers Co. were around 60s. earlier in the year, and have since moved up; the current price is around 71s. 6d. It may be recalled that the dividend of the last-named company was unchanged at 16¼ per cent., and that recently the maintenance of the interim payment at 6¼ per cent. was announced. Lever and Unilever, which were down to the 21s. level at one period, received a dividend of 5 per cent., a conservative policy being followed, pending clarification of the position in regard to the Dutch company. The subsequent improvement in Lever and Unilever shares to their current price of 29s. reflects market hopes that a better dividend may be in prospect. Borax Consolidated deferred units were no better than 25s. 3d. at one time, but are now 30s. 3d.; it may be recalled that the dividend payment was again 7½ per cent. In other directions, more attention was given to shares of companies engaged in the plastics industry, and there was activity in British Industrial Plastics and Erinoid. Earlier in the year the 5s. shares of the last-named company were quoted at 3s., but aided by the improved dividend of 10 per cent., they have since moved up to 7s. 6d.

RECENT TRADE LITERATURE

A pamphlet dealing with panels and control desks has recently been published by NEGRETTI AND ZAMBRA, 122 Regent Street, London, W.1. Although it is only of six pages, and the subject is one of particularly wide and diverse scope, the instruments and panels manufactured by the firm are well represented.

The latest issue of the *Allen Engineering Review* published quarterly by W. H. ALLEN, SONS AND CO., LTD., Bedford, and fully illustrated as usual, contains four articles, one of which describes, with much interesting detail, the application of models to problems connected with hydraulic research.

The current issue of Deco Trefoil published by the DENVER EQUIPMENT CO., LTD. (London office, 493a Northolt Road, South Harrow, Middlesex), has for its principal article a description of how efficient phosphate recovery from low grade matrix is made possible by utilising a larger volume of wash water than usual, bigger settling areas, and increased flotation capacity.

Stainless steel pumping equipment, for handling various acid solutions, is described in the latest issue of the *Electromet Review*, published by the ELECTRO METALLURGICAL CO., 30 East 42nd Street, New York City. There are also details of a steam trap made from 18/8 chrome-nickel steel, which is claimed to possess high corrosion-resistant qualities against the oxygen contained in the steam.

The current issue of *Tin and its Uses*, the quarterly review of the TIN RESEARCH INSTITUTE, Fraser Road, Greenford, Middlesex, examines the causes of difficulty in tinning certain batches of mild steel and explains various simple methods of rectification. Alternatives for palm oil and tallow in the hot-tinning processes have been discovered; these new oils are said to have excellent stability at high temperatures and considerable freedom from fuming and from fire hazard.

Important developments have recently taken place in the Hungarian bauxite and alumina industry. The Hungarian Bauxite Mining Co., Ltd., which operates bauxite deposits leased from the Hungarian government, has already carried out an increase in capital, to finance large-scale extensions. Now, the two Hungarian subsidiaries of the Swiss Bauxite Trust, the Aluminium Ore Mining Industry Co., Ltd., and the Bauxite Industry Co., Ltd., have jointly formed a new company, the Danube Basin Alumina Industry Co., Ltd., with a capital, fully paid up, of 8,000,000 pengoes. The new company will carry out a large-scale programme, including the extension of existing plants, the opening up of new deposits, and the erection of a new extraction plant.

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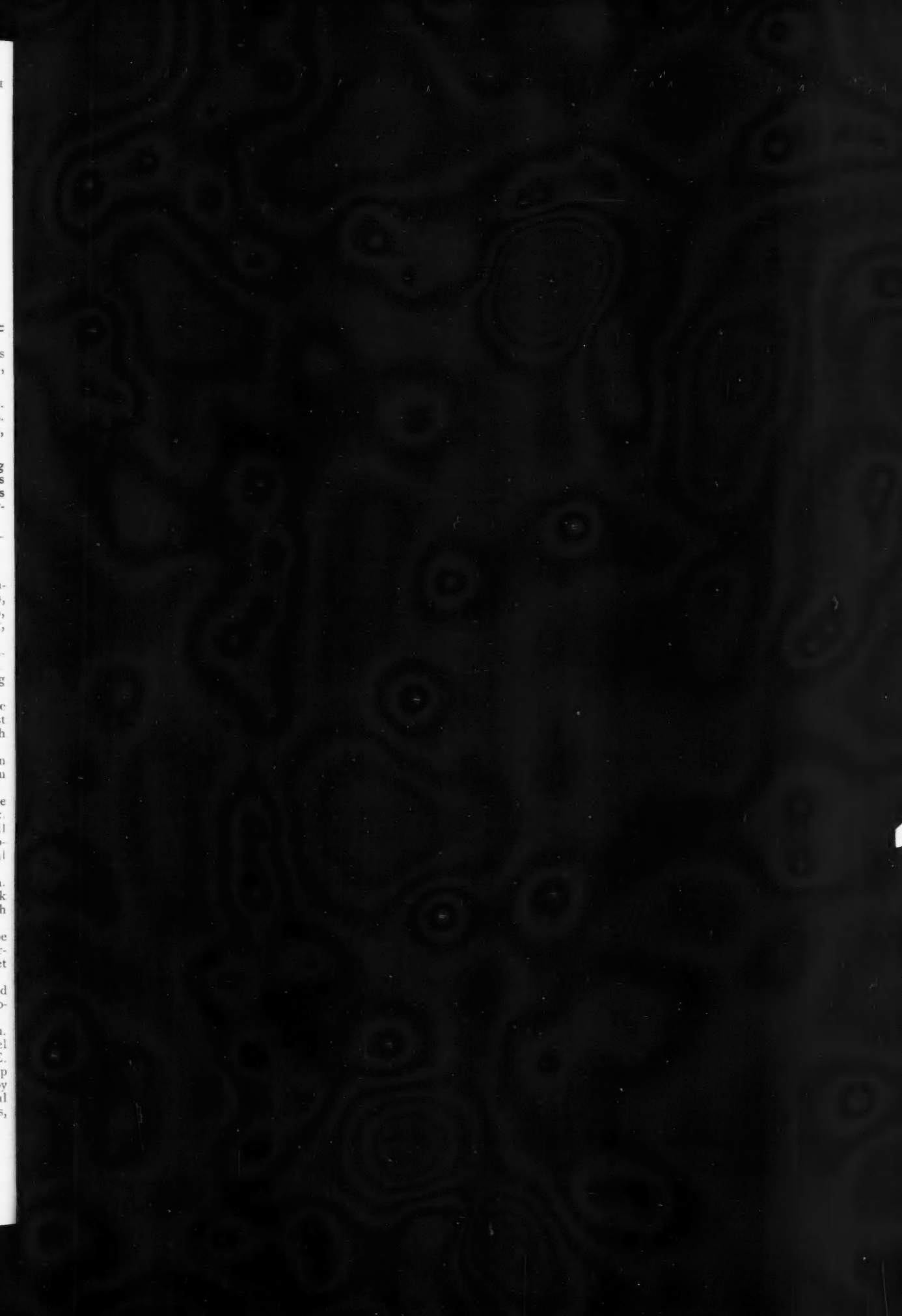

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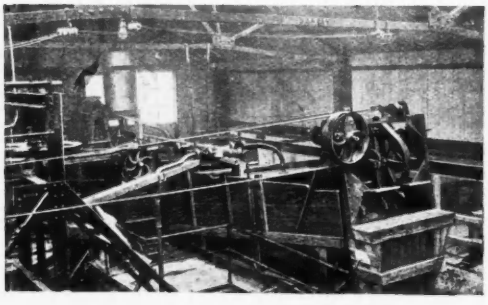

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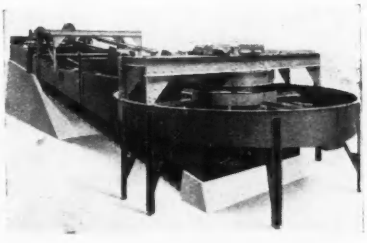

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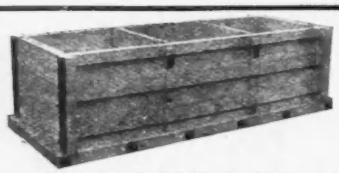

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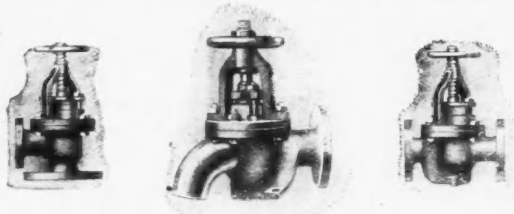
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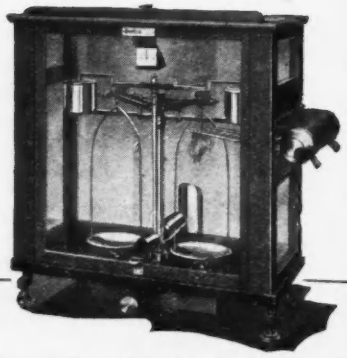
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